Economic Effects of Liberalization of the Right to Trade*

(Preliminary and Incomplete)

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Abstract

This paper discusses the economic effects of the liberalization of the right to conduct foreign trade. A theoretic model shows that gaining the right to conduct direct foreign trade can increase a firm's export sales, profit and the probability of export. Empirical evidence supports these results in general although the impact on profits is less conclusive. It is shown that gaining the right to trade can increase the export sales of a Chinese private-owned firm by as much as 114%.

Keywords: Right to trade, firm heterogeneity, trade liberalization

JEL Classification: F12, F13, F15

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1 Introduction

Existing literature on trade liberalization mainly focuses on trade barriers such as tariff and quota. The economic effects of restrictions on the right to conduct foreign trade directly and their deregulation have not been explored as far as we know. A typical case of such restrictions is China's foreign trade system before 2004. Until 1978, only no more than ten state-owned import and export companies had been allowed to conduct foreign trade, and all the other firms could only import or export by intermediated trade through those state-owned import and export companies (Lin and Schramm, 2003). An important dimension of trade liberalization in China is the liberalization on the restrictions of "the right to trade"[1], i.e. more and more firms, especially private-owned firms, have been allowed to conduct direct foreign trade. The effects of this dimension of trade liberalization on China's foreign trade are very much underexplored in the literature.

This paper introduces the restrictions on the right to trade into a two-country Melitz model based on Helpman, Melitz and Yeaple (2004). Particularly, we focus on the restrictions on direct export. Under such restrictions, only firms with a size larger than a certain threshold are allowed to conduct direct export, otherwise they have to export through some intermediaries[2]. The process of liberalization is modelled as a process of lowering down the restrictive threshold just as China did. Based on our comparative static analysis, we can predict the change of profits and sales of firms, and also the change in zero cutoff profit points and other variables in the model. According to the model, the export sales and profits of firms subject to the liberalization will increase. In the meantime, the probability of export for firms will increase, although surviving rates of firms will decrease. Using firm level data of China's manufactory industries, we have confirmed the results of our theoretic model and found that the liberalization can increase export sales of impacted firms by as much as 114%.

An important reason for the omission of analysis on the right to trade in trade liter-

[1]The term "the right to trade" in this paper refers to the right to conduct foreign trade directly. This term is used in the Protocal of China's accession into the WTO (WTO, 2001).

[2]Just as all Melitz models, productivity is perfectly related with firm size in our model, hence a threshold on firm size is equivilent to a threshold on productivity.

ature is because that trade literature has long ignored the analysis of specialized trading activity. It was said that mainstream international trade theories were actually theories about the structure of international production but not theories about the activity of trading (Herrmann-Pillath, 2006). Mainstream trade models did not differentiate direct trade from indirect trade. The same equilibrium was reached no matter trade is conducted by production firms themselves or through some intermediaries. However, this has started to change in recent years. Trade economists have finally started to show theoretic and empirical interests in specialized trading activity.

Rauch and his coauthors have discussed the role of networks and intermediaries in international trade (Rauch, 2001; Rauch and Waston, 2004). According to Rauch and Watson (2004), intermediaries may have no adequate incentives to maintain and expand their trading networks, hence tend to be too small. Rauch and Watson (2004) suggest that governments should intervene to encourage large-scale trading firms. Petropoulou (2008) explores the impact of information costs on matching activity by intermediaries, and she points out that intermdediation can unambiguously increase expected trade volume and social welfare. In a trade model with intermediation, Antrâs and Costinot (2009) discuss the welfare and policy implications of market integration. An interesting result from their model is that allowing foreign specialized traders to access a southern market may decrease aggregate welfare. Following that result, they have not been bold enough to suggest developing countries to use a full ban on foreign trading companies to improve efficiency, but they do suggest the use of price controls or taxes to intervene.

Several works have analysed intermediated trade empirically. Blum, Claro and Horstmann (2009) find that in the bilateral trade between Coloumbia and Chile, at least one of the exporter-importer pair is a large firm, hence they present a model in which the largest frims conduct direct trading, the smaller firms conduct indirect trading and the smallest ones only sell in the home country. Felbermayr and Jung (2009) find a similar result as above, and in their definitions, direct trade is defined as trade through firms' own foreign affilaites. Ahn, Khandelwal and Wei (2010) explore intermediated trade using a firm-level dataset. They assume that the firms with Chinese characters that have the

English-equivalent meaning of "importer", "exporter", and/or "trading" in the firm's name as specialized trading companies conducting intermediated trade. Based on that assumption, they find that intermediaries account for at least 20% of China's imports and exports in 2005. The same sorting pattern as revealed in Blum, Claro and Horstmann (2009) is also found by their empirical work. Based on a firm-level dataset covering 12,679 firms in 29 developing countries, Lu, Lu and Tao (2010) also find this sorting pattern.

Actually, there is no surprise that most of recent works on direct trading and indirect trading have reached the same result on the sorting pattern. All the works referred in the last paragraph have been based on Melitz (2003) model, using the same assumptions on marginal costs and fixed costs of different modes of trading, and sometimes using the same Pareto distribution to model productivity distribution. In fact, this sorting pattern will still hold even without Melitz setting, as long as firms' profit functions are supermodular in the marginal production costs and marginal trading costs (Mrázová and Neary, 2010).

The sorting pattern revealed by our paper has no difference from the existing literature. Our contributions to the literature are mainly the following two points: on the theoretic side, we will conduct a comparative static analysis to reveal how a policy restriction on the export modes and its deregulation will influence the firms' behaviour and performance, and the industry equilibrium as well. On the empirical side, we will reveal how important the liberalization on the right to trade is in China's process of trade liberalization.

The next section will discuss some policy background on China's liberalization on the right to trade. Section 3 will present a theoretic model and some comparaive static analysis. Section 4 will discuss data and empirical strategies. Section 5 presents empirical results. Section 6 concludes.

2 Policy Background

China's foreign trade system was highly centralized before the economic reform starting from 1978. On the eve of the 1978 reform, there were only about ten national state-owned import and export companies allowed to conduct foreign trade (Lin and Schramm, 2003). Those national companies had provincial subsidiaries and city-level subsidiaries, but contracts with foreign partners were only signed by headquarters of those national companies, and local subsidiaries were only responsible for sourcing products from producers.

The process of liberalization of the right to trade started in 1983, when some selected large and medium-sized state-owned manufacturing firms were granted the right to trade independently. In 1988, local subsidiaries of national import and export companies were allowed to be separated from their headquarters and to conduct foreign trade independently (Sun, 2004). Just before a new round of overall economic reform staring from 1994, the State Council approved the plan submitted by the Ministry of Foreign Trade and Economic Cooperation (MOFTEC) in May 1992, which started to grant large and medium-sized state-owned firms the right to trade systematically[3]. Since then, more and more large and medium-sized state-owned firms had been granted the right to trade, but the right to conduct import and export was still not open to private-owned firms.

From October 1998, for the first time, some private-owned firms began to be allowed to conduct foreign trade, and the minimum requirement was a registered capital of RMB 8.5 million[4]. On the 9th December 1999, Chinese government declared that all state-owned firms and collective-owned firms with a minimum capital of RMB 5 million could get the right to trade after a simple registration, which was symbolic of the start of the ending of the administrative examination and approval system of the right to trade[5]. One year later, Chinese government announced that from 1 January 2001 private-owned firms began to be subject to the same requirements and procedures as those of state-

[3]State Council, *A notification on forwarding related proposals by the MOFTEC and the Production Office of the State Council on granting firms the rights to import and export.* May, 11, 1992.

[4]MOFTEC, *Temporary regulation on granting private-owned production firms and research institutes the rights to conduct direct foreign trade.* October, 1, 1998.

[5]MOFTEC, *A notification on the launch of registration system on the rights to conduct direct foreign trade by state-owned and collective-owned production firms.* December, 9, 1999.

owned firms and collective-owned firms, and the minimum capital requirement was also RMB 5 million (RMB 2 million for machinary and electronic industries)[6]. The minimum capital requirement was decreased to RMB 3 million on the 10th July 2001 (RMB 1 million for machinary and electronic industries)[7], and further down to RMB 0.5 million on the 1st September 2003[8]. On the 1st July 2004, a new *Law of Foreign Trade* became effective. According to China's WTO commitments, the new *Law of Foreign Trade* finally deregulated almost all the barriers to the right to trade, hence all firms and individuals started to be allowed to conduct foreign trade in principle[9].

The process of deregulation on the right to trade is a long one spanning over two decades. However, the liberalization of the right to trade on private-owned firms is a relatively fast process. Large private-owned firms only started to get the right to trade at the end of 1998, but just after 6 years, all private-owned firms get the right to trade in 2004. The empirical study in this paper will mainly focus on private-owned firms. Before we do that, we present a model as our theoretic foundation.

3 The Model

Our model is a two-country model modified from Helpman, Melitz and Yeaple (2004), which is a one-period Melitz model. In our model, we assume that there are two ways of exporting: direct export and indirect export. Indirect export entails lower fixed export cost but requires higher marginal trade cost than direct export. The same assumption has already been used in the intermediary trade literature (e.g. Ahn, Khandelwal and Wei, 2010; Felbermayr and Jung, 2009).

The two countries both use labour to produce goods in $H + 1$ sectors: one sector producing a homogeneous product, which is our numeraire, and H sectors producing

[6]MOFTEC, *A notification on the change of the criteria to apply for the rights to conduct direct foreign trade by private-owned production firms and research institutes.* December, 9, 2000.

[7]MOFTEC, *Regulation on the qualification of conducting import and export.* July, 10, 2001.

[8]Ministry of Commerce, *A notification on the change of the criteria of qualifications of conducting import and export and the change of approval procedures.* July, 30, 2003. Note that the MOFTEC and part of the State Economic and Trade Commission were merged and renamed as the Ministry of Commerce in March 2003.

[9]The right to trade certain products, mostly commodities, such as crude oil, is still subject to restrictions.

differentiated products. Home country i owns a labour endowment of L^i and the foreign country j owns a labour endowment of L^j. The difference in labour endowments in these two countries is not too large and both countries produce the homogeneous product in the equilibrium. Each unit of homogeneous product is produced with one unit of labour. As a result, the common wage rate is one. In each country, a fraction of β_h of income is spent on differentiated products of sector h and a fraction of $1 - \sum_h \beta_h$ on the homogeneous good. The utility function of representative consumers in each country is

$$u = (1 - \sum_{h=1}^{H} \beta_h) \log z + \sum_{h=1}^{H} \frac{\beta_h}{\alpha_h} \log(\int_{v \in V_h} x_h(v)^{\alpha_h} dv),$$

in which z denotes consumption of the homogeneous good, $x_h(v)$ is the consumption of variety v from sector h, and V_h is the set of all potential varieties in sector h. Preferences across varieties in sector h has a CES form, and the elasticity of substitution $\varepsilon_h = 1/(1 - \alpha_h) > 1$.

The utility function has a Cobb-Douglas form across sectors, so the ratio of income used in the consumption of each section is fixed, which makes it possible to conduct analysis industry by industry. Let us focus on a particular sector h producing differentiated products. To simplify the notation, we drop the index h, and all secoral variables refer to sector h in the following analysis.

In order to enter into a sector h in the home country i, an entrant needs to pay a fixed entry cost of f_E, measured in labour unites. The entrant will then draw a marginal production cost a from a distribution $G(a)$. $1/a$ can be viewed as a measure of productivity of this firm. Later we will find that it is more handy to use another measure of productivity $a^{1-\varepsilon}$. If the drawn productivity is too low and the production profit is negative, the entrant will exit immediately. If the firm survives and decides to produce, it bears a fixed production cost of f_D. There is no further fixed cost if the firm only sells in domestic market. If the firm decides to export, it needs bear further fixed costs. The firm may enter into foreign market either by direct export or by indirect export. Exploring a new market needs some up-front expenditure, hence entering into the foreign market

entails further fixed export costs besides f_D. For direct export, there will be a fixed export cost of f_{DX}, and for indirect export, the fixed export cost will be f_{IX}.The cost of finding the final demanding customers is higher than the cost of finding intermediaries, hence $f_{DX} > f_{IX}$.

In order to export, an iceberg transport cost $\tau > 1$ will occur. If the export is conducted through intermediaries, intermediaries will charge an intermediation fee by a factor of $\gamma > 1$. This intermediation fee is also modelled as a melting-iceberg cost. Modelling transport cost in a melting-iceberg form makes it possible to conduct general equilibrium analysis without worrying about transport industry itself. The same reason applies to the iceberg intermediation cost. By assumptions above, the marginal production cost to sell a unit of product abroad by direct export is τa, and it is $\gamma\tau a$ in the case of indirect export. In the foreign country, the assumptions on fixed costs and marginal costs above apply as well.

Within each sector, producers of varieties engage in monopolistic competition. The price of a domestic variety is $p = a/\alpha$. For a variety exported directly, the price in the foreign market is $p = \tau a/\alpha$; and the price for a variety exported indirectly is $p = \gamma\tau a/\alpha$. As well known, the demand function for each variety in country k ($k = i$ or j) is

$$q^k = \frac{\beta E^k p^{-\varepsilon}}{(P^k)^{1-\varepsilon}}, \tag{1}$$

in which

$$P^k = \left(\int_0^{n^k} p(v)^{1-\varepsilon} dv\right)^{\frac{1}{1-\varepsilon}}.$$

In equations above, E^k is the aggregate spending in country k, which is equal to the total income in the country L^k. n^k is the total varieties available to consume in country k, including both domestic varieties and imported varieties.

3.1 Equilibrium without restrictions on rights to trade

Empirical literatures have long found that most firms serve only domestic markets (Bernard and Jensen....). In the mean time, even when subject to no policy restrictions, only a

part of exporting firms will conduct export directly (Ahn, Khandelwal and Wei, 2010). It is found that among exporting private-owned firms with the rights to conduct direct foreign trade in Zhejiang province of China, only no more than half of them exported directly (Hang, 2006). Based on such empirical facts, we assume

$$\tau^{\varepsilon-1} f_{DX} > \gamma^{\varepsilon-1}\tau^{\varepsilon-1} f_{IX} > f_D. \tag{2}$$

We will explain these assumptions in the following analysis.

For a domestic firm, the operating profits from serving the domestic market are

$$\begin{aligned} \pi_D^i &= (a/\alpha - a)q^i - f_D \\ &= a^{1-\varepsilon}B^i - f^D, \end{aligned}$$

in which

$$B^i = \frac{(1-\alpha)\beta E^i}{(\alpha P^i)^{1-\varepsilon}}. \tag{3}$$

In the mean time, if a firm exports, the additional operating profits from indirect export destined to country j are

$$\pi_{IX}^i = (\gamma\tau a)^{1-\varepsilon}B^j - f_{IX}.$$

If it exports by direct export, the additional operating profits are:

$$\pi_{DX}^i = (\tau a)^{1-\varepsilon}B^j - f_{DX}.$$

Similar to Helpman, Melitz and Yeaple (2004), the equilibrium is decided by three cutoff conditions and one free entry condition in each market. In the home market, the four conditions are:

$$(a_D^i)^{1-\varepsilon}B^i = f_D, \tag{4}$$

$$(a_{IX}^i\tau\gamma)^{1-\varepsilon}B^j = f_{IX}, \tag{5}$$

$$(1-\gamma^{1-\varepsilon})(a_{DX}^i)^{1-\varepsilon}\tau^{1-\varepsilon}B^j = f_{DX} - f_{IX}, \tag{6}$$

$$\begin{aligned} &V(a_D^i)B^i + \tau^{1-\tau}(1-\gamma^{1-\varepsilon})V(a_{DX}^i)B^j + \tau^{1-\varepsilon}\gamma^{1-\varepsilon}V(a_{IX}^i)B^j \\ &-[G(a_D^i)f_D + G(a_{DX}^i)(f_{DX} - f_{IX}) + G(a_{IX}^i)f_{IX} = f_E. \end{aligned} \tag{7}$$

In Equation (7), $V(a) = \int_0^a y^{1-\varepsilon} dG(y)$. There are also four conditions for the foreign market, which can be got by interchanging i and j in the four equations above. Equation (4) means that $(a_D^i)^{1-\varepsilon}$ is the zero-profit cutoff productivity, below which firms exits the market immediately after drawing its productivity from $G(a)$. In (5), $(a_{IX}^i)^{1-\varepsilon}$ is the cutoff productivity for export, above which firms may export. The highest cutoff productivity level $(a_{DX}^i)^{1-\varepsilon}$ is the cutoff productivity for direct export, above which firms export directly. Equation (7) is a free entry condition, which requires that the expected operational profit is equal to the fixed entry cost at equilibrium. Altogether, eight equations, four equations for each country, decide eight endogenous variables: $a_D^i, a_{IX}^i, a_{DX}^i, B^i, a_D^j, a_{IX}^j, a_{DX}^j, B^j$. Other variables can be derived from those eight variables. Profit lines for firms in home country are depicted in Figure 1.

3.2 Equilibrium with restrictions on rights to trade

Now let us introduce a restriction on rights to trade. Just as China did before 2005, a restriction on rights to trade stipulates a threshold capital. If a firm has a capital lower than the threshold, this firm is not allowed to conduct foreign trade directly. The amount of capital held by a firm can be viewed as a measure of firm size. In the mean time, firm size is perfectly related with productivity in Melitz model. To simplify the analysis, the restriction in our model is modelled as a threshold productivity $(a_R)^{1-\varepsilon}$, under which firms are not allowed to conduct direct trade. We also assume that the restriction is imposed by the home country but not by the foreign country. Obviously, such a restriction will be redundant if at the restriction threshold, $\pi_{DX}^i \leq \pi_{IX}^i$. Hence, for a non-redundant restriction, at the restriction threshold $(a_R)^{1-\varepsilon}$, we have $\pi_{DX}^i > \pi_{IX}^i$.

The four conditions for country j will still be the same as the case without restrictions

on rights to trade. However, the equilibrium conditions for the country i, which imposes restrictions, need to be modified. For a non-redundant restriction, $(a_R)^{1-\varepsilon}$ rather than $(a^i_{DX})^{1-\varepsilon}$ becomes the cutoff point between direct exporters and indirect exporters. The free entry condition needs to be modified accordingly. The conditions for home country become:

$$(a^i_D)^{1-\varepsilon}B^i = f_D, \tag{8}$$

$$(a^i_{IX}\tau\gamma)^{1-\varepsilon}B^j = f_{IX}, \tag{9}$$

$$\begin{aligned} &V(a^i_D)B^i + \tau^{1-\tau}(1-\gamma^{1-\varepsilon})V(a_R)B^j + \tau^{1-\varepsilon}\gamma^{1-\varepsilon}V(a^i_{IX})B^j \\ &-[G(a^i_D)f_D + G(a_R)(f_{DX} - f_{IX}) + G(a^i_{IX})f_{IX} = f_E. \end{aligned} \tag{10}$$

Altogether, we have seven equations to decide seven endogenous variables, which are $a^i_D, a^i_{IX}, B^i, a^j_D, a^j_{IX}, a^j_{DX}, B^j$. Note that a_R is an exogenous policy variable now. To make sure the restriction is not redundant, we need to have another condition $\pi^i_{DX} > \pi^i_{IX}$, i.e.

$$B^j\tau^{1-\varepsilon}(1-\gamma^{1-\varepsilon})(a_R)^{1-\varepsilon} - (f_{DX} - f_{IX}) > 0. \tag{11}$$

If the restriction is redundant, the equilibrium will be the same as that in the case without restriction.

In Figure 1, when there is a non-redundant restriction. The profit of an exporting firm will be case shown by the bold dark lines. Different from the case without restrictions, the profit is not continuous with productivity level any more. There is a discontinuity at the restrictive threshold productivity level.

3.3 Comparative Static Analysis

What will happen if the domestic government loosen the restriction on rights to trade? Just as that in China, we assume the process of liberalization is to allow more and more firms to conduct direct foreign trade. In this model, we focus on exporting side of foreign trade, and assume that the liberalization allows more and more firms to export

directly. Firms with relatively smaller size, lower productivity and higher marginal cost are gradually allowed to export directly. In the language of our model, this is an increase in a_R or a decrease in $(a_R)^{1-\varepsilon}$.

Some effects on firms directly impacted can be seen immediately without a full comparative static analysis on the equilibrium.

Proposition 1 *If a firm without rights to export directly is granted such rights, its profit will increase and its export sales revenue will increase as well.*

Proof. From Figure 1, we can see that if a firm without rights to export directly gets the rights, its export profit will jump from π^i_{IX} to π^i_{DX}, which brings an increase in profit. This is true because the restriction is not redundant. Its export sales will increase accordingly. Using r to denote sales revenue, we have $\pi^i_{IX} = r^i_{IX}/\varepsilon - f_{IX}$, and $\pi^i_{DX} = r^i_{DX}/\varepsilon - f_{DX}$.As $\pi^i_{DX} > \pi^i_{IX}$, we have $r^i_{DX} - r^i_{IX} > \varepsilon(f_{DX} - f_{IX})$.From (2), we know that $f_{DX} > \gamma^{\varepsilon-1} f_{IX} > f_{IX}$. Hence we have $r^i_{DX} > r^i_{IX}$. ■

To find out more interesting efffects, we need to conduct a comparative static analysis on the general equilibrium. Totally differentiate the seven equilibrium conditions:(8)-(10) and the foreign version of (4)-(7), and devide the resulted equations by da_R, we will get:

Proposition 2 *If the restriction is not redundant, the liberalization, i.e. an increase in a_R will induce to a decrease in a^i_D, B^i, a^j_{IX}, and a^j_{DX} and an increase in a^i_{IX}, a^j_D,and B^j.*

Proof. See the Appendix. ■

From Proposition 2, we can also have

Lemma 1 *The liberalization will increase the ratio of exporters among all surviving firms in the home country.*

Proof. We use p_{ex} to denote the ratio of exporters among all surviving firms. As $p_{ex} = G(a^i_{IX})/G(a^i_D)$. The liberalization will induce to a decrease in a^i_D and an increase in a^i_{IX}, so p_{ex} will increase. ■

To understand the results above, we need to note the unbalanced effects of liberalization on firms. The liberalization has direct impact on firms with relatively higher productivity, i.e. those firms which are supposed to be able to export directly if there are no restrictions. The firms with relatively lower productivity, i.e. those only sell goods domestically will not benefit from the liberalization. When the high-productivity firms expand the total sales, they will need to employ more labours. The competition in the labour market will driven the least productive firms out of the market, which decrease a_D^i. As that has been pointed out in Section 7.2 of Melitz (2003), when there are higher potential returns associated with a good productivity draw, more entry will occur, which further intensifies the competition for labour resources and put more pressure on low-productive firms.

The decrease in a_D^i means that the home market becomes a more competitive market, which decreases the price index in the home market, and hence decreases B^i according to Equation (3). The decrease in B^i means that the home market now provides less opportunity for foreign firms, and only more productive foreign firms are able to export to the home market. That is why a_{IX}^j, and a_{DX}^j decrease. In the foreign market, when exporters have less opportunity to profit from exporting, their revenues decrease and their employment will decrease as well. Such a change will lower the competition in the labour market hence provides a higher surviving possibility for least productive firms, which explains an increase in a_D^j. When more less productive entrants are able to survive in the market, the foreign market becomes less competitive and its price index and B^j will increase, which provides more opportunities for exporters in the home country, hence there is an increase in a_{IX}^i.

4 Data

The data used in this paper are from Chinese Industrial Survey Datasets. These datasets have been used in other works such as Hsieh and Klenow (2009). The data used in this paper are from 1998 to 2005, which cover the whole process of liberalization of the right

to trade for private-owned firms. The data are yearly firm-level data, covering all state-owned firms in China and other firms of medium and large size. For each firm, variables such as total sales, export sales, total employment, total capital, total asset, total liability, value-added, profits and others are available. The export sales documented in the datasets are in Chinese Yuan.

The aim of our research is to identify and quantify when a firm is allowed to have the right to trade, how its export sales, profits, and probability of export will change. According to Chinese regulations, when the righ to trade is openned to a firm, this firm need to go through a procudure to register itself in some governmental agencies. This registration procedure is simple. If a firm does not bother to do it itself, it can always delegate some companies to do the registration procudure, and the fee is as low as around 2000 Yuan, which is equivalent to no more than USD 300. However, many firms choose not to register themselves for the right to trade. These firms either do not export and import at all, or they just use intermediaries to conduct foreign trade and have no intention to import or export directly.

In our research, when we say the right to trade is available to a firm, we do not mean this firm has registered itself to the government and has got the right to trade officially, actually we do not have the list of all the registered firms; instead we mean the right to trade is available to the firm, and the firm can conduct direct trading after the registration.

The timetables for the liberalization of the right to trade are different for firms with different ownership. Domestic private-owned firms started to be liberalized after 1998, while the process of liberalization for state-owned and collective-owned firms was much earlier. Foreign-owned firms including Hong Kong, Taiwan and Macao-owned firms had already got the right to trade before 1998. Firms located in Special Economic Zones (SEZs) have policy priviledges on foreign trade, which had already got the right to trade before 1998 as well. Our empirical research will mainly focus on the impact of the liberalization on private-owned firms. The state-owned and Collective-owned firms will be dropped from the dataset. We will use foreign-owned firms and firms located in Special

Economic Zones as a control group.

5 Regression Results

We will test three hypotheses on the firm-level reaction to the right to trade.

Hypothesis 1: If a firm is granted the right to trade, its export sales revenue will be higher.

Hypothesis 2: If a firm is granted the right to trade, its profit will be higher.

Hypothesis 3: If a firm is granted the right to trade, its probability of export will be higher.

The econometric methods we will use are Difference in Difference analysis and Difference in Difference in Difference analysis.

5.1 Export sales and the right to trade

The first thing we want to test is Hypothesis 1. According to Proposition 1, If a firm without the right to trade gets such rights, its export sales will increase. We want to test this conclusion and quantify how much difference the right to trade will make.

The first step is a Difference in Difference (DD) analysis. We only use data for private-owned firms for DD analysis. According to regulations and governmental documents we introduced above, we carefully indentify if the right to trade is available to each firm in each year. The basic model we estimate is:

$$\begin{aligned} \ln\_export &= \beta_0 + \beta_1 Dtrade + \beta_2 \ln\_capital + \beta_3 \ln\_asset + \beta_4 age \\ &\quad + \beta_{5t} year + \beta_{6p} province + \beta_{7i} industry. \end{aligned} \tag{12}$$

In the equation above, $\ln\_export$ is the logarithm of the export sales of a firm in a certain year. When we take logarithm, we add 1 Yuan to the export sales to avoid negative values. The same practice applies to other log variables such as $\ln\_capital$ and $\ln\_asset$. $Dtrade$ is a dummy variable to denote the right to trade, and it is 1 if the

right to trade is available to the firm. *age* is calculated at the end of each year. For example, if a firm was established in June 1980, for an observation of 2004, the age of the firm is 24 and half years. A set of year dummies, a set of province dummies and a set of industry dummies are included to estimate fixed effects of each year, each province and each industry. In the original data, the location was as detailed as village-level. We only use province-level location information here. The industries are classified at 2-digit level in our regressions. Note that in the regression equation above, if a β has two-digit/letter subscripts, then it implies a vector of parameters.

The regression model above is in essence a Difference in Difference model. Firms got rights to trade at different time according to its capital level. After controlling the capital level and yearly growth of export of all firms, β_1 can reveal the difference between the case with the right to trade and the case without the right to trade for a firm of certain capital level.

Table 1 documents the results of our regressions. Column 1 is the result for our base model (12). In columns 2 and 3, we use *employment* to further control the firm size., which is the logarithm of total asset, instead of ln _*sales* to control the size of the firm. *employment* is the yearly average number of total employees. All the results have reported cluster robust standard error. The first two columns use cluster standard errors by industry and provinces, while the third one reports standard errors clustered by industry, province and years. If we compare column 2 with clolumn 3, we can see that the difference between cluster standard errors for coefficients of *Dtrade* at different levels is small. When serial correlation issue suggested by Bertrand, Duflo and Mullainathan (2004) is likely to exist, Arellano (1987) and Angrist and Pischke (2009, p. 319)'s suggestion is to "pass the clustering buck one level higher". In our case, standard errors should be clustered by state and industry, rather than state, industry and year. In the following regressions, we will only report robust standard errors clustered by industry and province. Considering that ln _*export* is censored on the left at 0, we also report Tobit regression results in column 4.

Table 1 shows that the effect of the right to trade on fims' export sales is highly

significant. $\beta_1 = 0.3318$ in OLS regressions in columns 2 and 3, and $\beta_1 = 0.9086$ in the Tobit regression. These two estimates are equivalent to increases in export sales by 39% and 148%. If we believe Tobit model is better than OLS when there are a lot of firms with no export, the effect of the right to trade on export sales may be as high as an increase by 148%.

In the DD analysis, although we have controlled the time trend by yearly fixed effects, and also the intrinsic difference between different firms with different capital level, there may be some shocks other than the liberalization of the right to trade, which will impact firms with different capital differently. Such shocks will cause biases in our DD regressions. For example, the decrease in tariff, freight and other trade cost will influence different firms in different ways. Firms with larger sizes and more capital may benefit from the decrease in trade cost more than smaller firms. In Mrázová and Neary (2010) 's word, "to those who have, more shall be given". The effect of such shocks may be mixed with the impact of the liberalization on the right to trade, which will cause biases in our DD regressions. In order to control such shocks, we can resort to Difference in Difference in Difference (DDD) regressions. Foreign Invested Enterprises (FIEs) and all firms located in Special Economic Zones (SEZs) had already got rights to trade before 1998. During the period 1999-2005, which our data cover, FIEs and all firms in SEZs faced no policy shock of rights to trade, hence we use them as our control group. The base model we estimate is:

$$\begin{aligned} \ln\_export &= \beta_0 + \beta_1 Dtrade * Dtreat + \beta_2 Dtreat + \beta_3 \ln\_capital + \beta_4 Dtreat * \ln\_capital \\ &\quad + \beta_5 \ln\_asset + \beta_6 age + \beta_7 employment + \beta_{8t} year + \beta_{9t} year * Dtreat \\ &\quad + \beta_{10t} year * \ln\_capital + \beta_{11p} province + \beta_{12i} industry. \end{aligned} \tag{13}$$

In the regression of Equation (13), we have included all observation of private-owned firms and FIEs, including those locate in SEZs. *Dtreat* is a dummy variable, which equals 1 if the observation is of a private-owned firm that does not locate within a SEZ. The term $Dtreat * \ln\_capital$ controls the difference between the impact of capital level for

the treatment group and that of the controll group. The coefficient we are interested in is β_1.

Table 2 reports the results of the DDD regression. Column 1 and 2 are OLS results and Tobit results of the regressions on our base model (13). IIn column 3 and 4, we have added more interactive terms to control some interactive effects, which include $Dtreat{*}ln\_asset$, $Dtreat * age$, $Dtreat * employment$, $year * ln\_asset$ and $year * employment$. For both OLS and Tobit results, the estimats of β_1 by DDD regressions are higher than those in DD regressions. From column 3 and 4, the OLS and Tobit estimates of β_1 are 0.3628 and 0.7621, which means increases of export sales by 44% and 114%. By Tobit model, gaining the right to trade can more than double the export sales of a private-owned firm. Although this is quite a large number, it is not unreasonable if we compare it with the total export growth of China during the same period, which was an increase by 3.15 times from US$183.8 billion in 1998 to US$762.0 billion in 2005 (China Statistitics Yearbook, 2009).

5.2 Profit and the right to trade

Hypothesis 2 above says that gaining the right to trade can improve firms' profits. This also follows Proposition 1 of our theoretic model. As some firms have negative profits, we can not use the log-log model above. A linear-log model was estimated. However, as profits tend to increase with production quantities with a decreasing rate, it may be more proper to use linear model with quadratic terms to estimate profits. We have tried both specifications.

Table 3 reports the DD regression and DDD regression use both linear-log specification and linear specification with quadratic terms. The goodness of fit of the specification with quadratic terms is much higher than the linear-log specification. The two specifications give us opposite results on the impact of the right to trade on profits. The result from the linear-log model shows a negative impact on profits. However, if we put more trust on the DDD regression with the specification with quadratic terms, the right to trade can bring a firm a yearly average profit of 0.82 million Yuan.

5.3 The probability of export and the right to trade

Next, we explore how gaining the right to trade can influence the probability of export of the impacted firm. Our theoretic analysis above shows that The liberalization will increase the ratio of exporters among all surviving firms in the home country. However, in order to test it, it is not proper just calculating the ratios in different years and compare them. Many other factors may influence such ratio by influencing the number of surviving firms and exporting firms. Instead, we run regressions on discrete choice models to test if gaining the right to trade can increase an impacted firms' probability of export controlling other possible factors.

We conduct both Logit and Probit regressions. Fot both Logit model and Probit model, we introduce two different specifications, one with log terms, and the other with quadratic terms. When there are a lot of dummy variables, there are possibility for Logit and Probit models not to converge in the maximum likelyhood estimations. In order to make the specifications simpler and easier to converge, we change the year dummies into a single trend variable *time*: we just put the year of 1998 as $time = 0$, the year of 1999 as $time = 1$, and etc.

In table 4, the results of all the 4 specifications are reported. We are interested in the coefficients of the term $Dtrade * Dtreat$, the estimates of which are all highly significant at 1%. In order to make the estimates from the Logit specifications and the Probit ones comparable, we also report marginal effects in the square brackets. These marginal effects are calculated assuming that all the other independent variables are at their average levels. The estimates show that gaining the right to trade can increase the probability of export of a firm by about 1.23 to 3.53 percentage.

6 Concluding Remarks

In this paper, we have discussed the economic effects of the liberalization of the right to conduct foregn trade. This dimension of trade liberalization is rarely discussed by trade literature.

Our theoretic analysis is based on a two-country Melitz model. Comparative static policy analysis is conducted on the model. Actually, although Melitz model has become a standard model in the trade literature, comparative static policy analysis within the Melitz framework is sometimes difficult to do because of the complexity of the model. In the original paper, Melitz conducts a comparative static analysis assuming trade liberalization is multilateral and symmetrical. What are the economic effects if a country conducts a unilateral liberalization or if different countries conduct asymmetrical liberalization? Demidova and Rodríguez-Clare (2009) conduct a trade policy analysis with a small economy assumption. Different from Demidova and Rodríguez-Clare (2009), our analysis use a two-country model and only focuses on the liberalization of the right to trade.

Our theoretic model shows that gaining the right to conduct direct foreign trade can increase a firm's export sales, profit and the probability of export. The empirical evidence supports these results in general although the impact on profits is less conclusive. It is shown that gaining the right to trade can increase the export sales of a Chinese private-owned firm by as much as 114%. Such a large quantity effect is an important reason for the huge increase of Chinese export during 1998 to 2005.

Although the quantity effect is large, the effect of liberalization on the profit of firms is less conclusive. Different model specifications give opposite results. Although profit may increase because of the decrease of intermediated trade cost when a firm is granted the right to trade, it is also likely to decrease because of the deterioration of terms of trade due to a large increase of export volume.

In this paper, we only explore one dimension of trade liberalization, the liberalization of the right to trade, which is rarely discussed in the literature. We have basically assume that the tariff, which is part of the trade costs in the model, is unchange. Further research may consider both dimensions of trade liberalization and explore the interactive effects between them.

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Appendix

Proof of Proposition 2

Proof. Totally differentiate Equations (8)-(10) and the foreign version of Equations (4)-(7). Note that we can get the foreign version of Equations (4)-(7) by simply interchanging i and j in them. Devide all the resulted equations by da_R, and simplify the equations, we will have

$$\frac{da_D^i}{da_R} = \frac{a_D^i}{B^i(\varepsilon-1)}.\frac{dB^i}{da_R}, \tag{A1}$$

$$\frac{da_{IX}^i}{da_R} = \frac{a_{IX}^i}{B^j(\varepsilon-1)}.\frac{dB^j}{da_R}, \tag{A2}$$

$$\begin{aligned}[(B^i(a_D^i)^{1-\varepsilon} - f_D)g(a_D^i)]\frac{da_D^i}{da_R} + [B^j\tau^{1-\varepsilon}(1-\gamma^{1-\varepsilon})a_R^{1-\varepsilon} - (f_{DX}-f_{IX})]g(a_R)\\ +[(B^j\tau^{1-\varepsilon}\gamma^{1-\varepsilon}(a_{IX}^i)^{1-\varepsilon} - f_{IX})g(a_{IX}^i)]\frac{da_{IX}^i}{da_R} + V(a_D^i)\frac{dB^i}{da^R}\\ +[\tau^{1-\varepsilon}(1-\gamma^{1-\varepsilon})V(a_R) + \tau^{1-\varepsilon}\gamma^{1-\varepsilon}V(a_{IX}^i)]\frac{dB^j}{da_R} = 0,\end{aligned} \tag{A3}$$

$$\frac{da_D^j}{da_R} = \frac{a_D^j}{B^j(\varepsilon-1)}.\frac{dB^j}{da_R}, \tag{A4}$$

$$\frac{da_{IX}^j}{da_R} = \frac{a_{IX}^j}{B^i(\varepsilon-1)}.\frac{dB^i}{da_R}, \tag{A5}$$

$$\frac{da_{DX}^j}{da_R} = \frac{a_{DX}^j}{B^i(\varepsilon-1)}.\frac{dB^i}{da_R}, \tag{A6}$$

$$\begin{aligned}[(B^j(a_D^j)^{1-\varepsilon} - f_D)g(a_D^j)]\frac{da_D^j}{da_R} + [B^i\tau^{1-\varepsilon}(1-\gamma^{1-\varepsilon})(a_{DX}^j)^{1-\varepsilon} - (f_{DX}-f_{IX})]g(a_{DX}^j)\frac{da_{DX}^j}{da_R}\\ +[(B^i\tau^{1-\varepsilon}\gamma^{1-\varepsilon}(a_{IX}^j)^{1-\varepsilon} - f_{IX})g(a_{IX}^j)]\frac{da_{IX}^j}{da_R} + V(a_D^j)\frac{dB^j}{da^R}\\ +[\tau^{1-\varepsilon}(1-\gamma^{1-\varepsilon})V(a_{DX}^j) + \tau^{1-\varepsilon}\gamma^{1-\varepsilon}V(a_{IX}^j)]\frac{dB^i}{da_R} = 0.\end{aligned} \tag{A7}$$

Equations (A1)-(A7) decide 7 variables, all of which are derivatives with respect to da_R.Using Equations (8)-(9) and the foreign version of Equations (4)-(6), we can see that the first and the third terms of (A3), the first to the third terms of (A7) are all zero.

Using (A7) into (A3), we will have

$$V(a_D^j)[B^j\tau^{1-\varepsilon}(1-\gamma^{1-\varepsilon})a_R^{1-\varepsilon}-(f_{DX}-f_{IX})]g(a_R)+V(a_D^i)V\left(a_D^j\right)\frac{dB^i}{da_R} \tag{A8}$$
$$-[\tau^{1-\varepsilon}(1-\gamma^{1-\varepsilon})V(a_R)+\tau^{1-\varepsilon}\gamma^{1-\varepsilon}V(a_{IX}^i)].[\tau^{1-\varepsilon}(1-\gamma^{1-\varepsilon})V(a_{DX}^j)+\tau^{1-\varepsilon}\gamma^{1-\varepsilon}V(a_{IX}^j)]\frac{dB^i}{da_R}=0.$$

The first term of (A8) is positive because of the non-redundant restriction condition (11). By definition, $V(a_D^i)>V(a_R)$,and $V(a_D^i)>V(a_{IX}^i)$, hence we have

$$\begin{aligned} V(a_D^i) &> (1-\gamma^{1-\varepsilon})V(a_R)+\gamma^{1-\varepsilon}V(a_{IX}^i) \\ &> \tau^{1-\varepsilon}(1-\gamma^{1-\varepsilon})V(a_R)+\tau^{1-\varepsilon}\gamma^{1-\varepsilon}V(a_{IX}^i). \end{aligned} \tag{A9}$$

Note that we have used $\tau>1,\gamma>1$,and $\varepsilon>1$ in the inequalities above.

Similarly we have

$$\begin{aligned} V(a_D^j) &> (1-\gamma^{1-\varepsilon})V(a_{DX}^j)+\gamma^{1-\varepsilon}V(a_{IX}^j) \\ &> \tau^{1-\varepsilon}(1-\gamma^{1-\varepsilon})V(a_{DX}^j)+\tau^{1-\varepsilon}\gamma^{1-\varepsilon}V(a_{IX}^j). \end{aligned} \tag{A10}$$

Using (A9) and A(10) into (A8), then we will get $\frac{dB^i}{da_R}<0$.Then from (A1), (A2), (A4)-A(7), we will have $\frac{da_D^i}{da_R}<0$, $\frac{da_{IX}^i}{da_R}>0$, $\frac{da_D^j}{da_R}>0$, $\frac{da_{IX}^j}{da_R}<0$, $\frac{da_{DX}^j}{da_R}<0$,and $\frac{dB^j}{da_R}>0$. ■

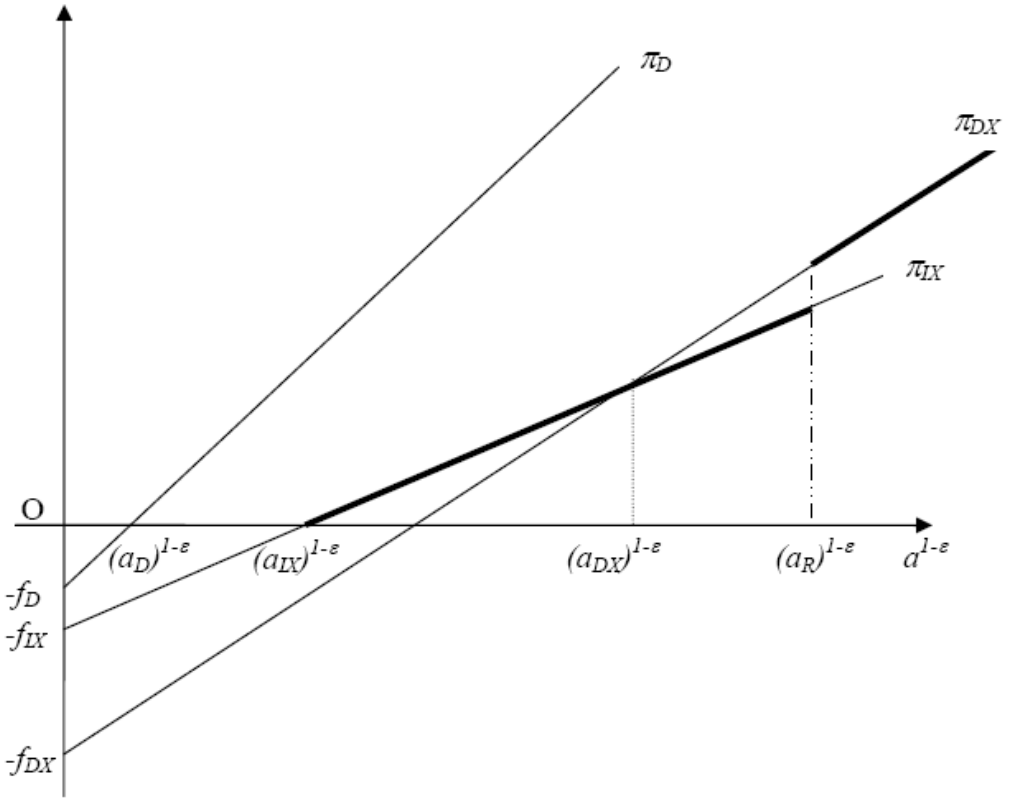

Figure 1: Profits from domestic sales, from indirect export and from direct export

Table 1: DD analysis on the effect of the right to trade on export sales

	(1) ln_trade (OLS)	(2) ln_trade (OLS)	(3) ln_trade (OLS)	(4) ln_trade (Tobit)
main				
Dtrade	0.3855***	0.3318***	0.3318***	0.9086***
	(0.0540)	(0.0549)	(0.0546)	(0.2255)
ln_capital	0.0203	0.0129	0.0129	0.1005
	(0.0112)	(0.0108)	(0.0078)	(0.0692)
ln_asset	0.5213***	0.3545***	0.3545***	2.4074***
	(0.0357)	(0.0389)	(0.0256)	(0.2377)
age	0.0330***	0.0280***	0.0280***	0.1287***
	(0.0039)	(0.0038)	(0.0020)	(0.0145)
employment		0.0016***	0.0016***	0.0034***
		(0.0002)	(0.0002)	(0.0006)
N	671037	671037	671037	671037
r2	0.1733	0.1848	0.1848	
F	.	.	232.5518	.
ll	-2.132e+06	-2.127e+06	-2.127e+06	-7.517e+05

Standard errors in parentheses

Standard errors are clustered by industry and province in (1), (2) and (4), and by industry, province and year in (3).

Dummy variables for industry, province and year are included but not reported.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2: DDD analysis on the impact of the right to trade on export sales

	(1) ln_trade (OLS)	(2) ln_trade (Tobit)	(3) ln_trade (OLS)	(4) ln_trade (Tobit)
main				
Dtrade*Dtreat	0.3700***	0.9880***	0.3628***	0.7621***
	(0.0654)	(0.2139)	(0.0663)	(0.2044)
Dtreat	-1.7386**	-13.7089***	-2.4941*	-19.0465***
	(0.6042)	(2.0614)	(1.0360)	(3.7829)
ln_capital	0.2609***	0.4064***	0.3938***	0.9754***
	(0.0356)	(0.0903)	(0.0368)	(0.1069)
Dtreat* ln_capital	-0.2659***	-0.0412	-0.3324***	-0.7364***
	(0.0383)	(0.1033)	(0.0353)	(0.0895)
ln_asset	0.3152***	1.2378***	0.0692	0.2482
	(0.0343)	(0.1168)	(0.0539)	(0.1507)
age	0.0323***	0.1048***	0.0565***	0.0934***
	(0.0037)	(0.0108)	(0.0111)	(0.0216)
employment	0.0015***	0.0023***	0.0014***	0.0017**
	(0.0002)	(0.0001)	(0.0004)	(0.0005)
Dtreat* ln_asset			0.1159*	0.9360***
			(0.0551)	(0.2074)
N	948820	948820	948820	948820
r2	0.3230		0.3244	
F	236.9859	.	.	.
ll	-3.097e+06	-1.533e+06	-3.096e+06	-1.532e+06

Standard errors in parentheses

Standard errors are clustered by industry and province

Other independent variables include year, year*Dtreat, year*ln_capital, province, and industry in (1)-(4), and Dtreat*Employment, Dtreat*age, year*ln_asset, year*employment are also included in (3)-(4).

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Analysis on profits

	(1) profit (DD, with log terms)	(2) profit (DD, with quadratic terms)	(3) profit (DDD, with log terms)	(4) profit (DDD, with quadratic terms)
Dtrade	-2.325e+06	6.894e+05*		
	(1.188e+06)	(3.010e+05)		
Dtrade*Dtreat			-2.630e+06*	8.183e+05**
			(1.113e+06)	(2.915e+05)
ln_capital	12668.3023		-1.040e+06***	
	(72014.5322)		(3.131e+05)	
ln_asset	-2.600e+06		-1.764e+05	
	(3.081e+06)		(1.934e+06)	
age	-1.255e+05	-2.832e+04***	-1.009e+05*	53435.5856
	(77748.2344)	(6162.5741)	(39595.6500)	(29666.7364)
employment	46373.0475	5083.6123**	32369.2901	3614.0052*
	(30599.4388)	(1779.7804)	(17003.9448)	(1824.4785)
capital		-0.1423***		-0.1983***
		(0.0407)		(0.0513)
asset		0.0584***		0.0727**
		(0.0125)		(0.0249)
Dtreat			2.872e+06	8.444e+05
			(9.400e+06)	(6.375e+05)
N	671052	671173	948852	948996
r2	0.1289	0.9585	0.1141	0.8076
F	.	.	.	.
ll	-1.294e+07	-1.192e+07	-1.829e+07	-1.757e+07

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Analysis on the probability of export

	(1) Logit model (DDD with log terms)	(2) Logit model (DDD with quadratic terms)	(3) Probit model (DDD with log terms)	(4) Probit model (DDD with quadratic terms)
Dtrade*Dtreat	0.0649**	0.1495**	0.0444***	0.1072***
	(0.0233)	(0.0544)	(0.0127)	(0.0191)
	[0.0123]	[0.0288]	[0.0146]	[0.0353]
Dtreat	-0.9744***	-1.7062***	-0.6447***	-1.0063***
	(0.2056)	(0.0888)	(0.1113)	(0.0359)
ln_capital	0.0659***		0.0340***	
	(0.0124)		(0.0072)	
ln_asset	0.0295*		0.0361***	
	(0.0150)		(0.0082)	
capital		0.0000		0.0000*
		(0.0000)		(0.0000)
asset		-0.0000		-0.0000
		(0.0000)		(0.0000)
N	948367	948511	948367	948511
Psudo r2	0.2716	0.2729	0.2697	0.2695
ll	-4.347e+05	-4.340e+05	-4.359e+05	-4.360e+05

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
For Dtrade*Dtreat, the marginal effects on the probability of export are reported within square brackets.